

**UNIVERSITI TEKNOLOGI MARA**

**BLOOD-BASED BIOMARKERS FOR EARLY  
DETECTION OF ALZHEIMER'S DISEASE**

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## TABLE OF CONTENTS

|                              | <b>Page</b>         |
|------------------------------|---------------------|
| <b>TITLE PAGE</b>            |                     |
| <b>APPROVAL</b>              | <b>ii</b>           |
| <b>ACKNOWLEDGEMENT</b>       | <b>iii</b>          |
| <b>TABLE OF CONTENTS</b>     | <b>iv</b>           |
| <b>LIST OF EQUATIONS</b>     | <b>vii</b>          |
| <b>LIST OF FIGURES</b>       | <b>viii</b>         |
| <b>LIST OF TABLES</b>        | <b>x</b>            |
| <b>LIST OF ABBREVIATIONS</b> | <b>xi</b>           |
| <b>ABSTRACT</b>              | <b>xii</b>          |
| <br>                         |                     |
| <b>CHAPTER ONE</b>           | <b>INTRODUCTION</b> |
| 1.1 Background of Study      | 1                   |
| 1.2 Problem Statement        | 2                   |
| 1.3 Objective of Study       | 5                   |
| 1.4 Significance of Study    | 6                   |

## ABSTRACT

Alzheimer's disease (AD) is one of the most common forms of dementia. Finding a biomarker for early detection of AD based on blood source has been a goal of researchers for many years. Studies have proven about 80% of human gene expression are found in the blood. We performed quantitative real-time polymerase chain reaction (RT-PCR) to determine the relative expression of gene in AD compared to healthy subjects by using mathematical model called Pfaffl method. Based on the Pfaffl method, we found that the relative expression of mitogen-activated protein kinase (MAP2K1) was higher relative to healthy subjects based on fold change ratio after normalization with reference gene, beta-actin ( $\beta$ -actin). This study provides evidence that blood can be a source of biomarkers for early detection of AD and thus can give an impact in terms of clinical practice, and ultimately may improve the patient's quality of life.

# CHAPTER 1

## INTRODUCTION

### 1.1 Background of study

Alzheimer's disease (AD) is one of the most common forms of dementia and the estimated lifetime risk for developing AD is about 20% in women and 10% in men with the age of 65 years old and above (Chouliaras et al., 2010).

It is a chronic neurodegenerative disorder. AD is an age-related, progressive neurodegenerative disease resulting in the loss of cognitive ability necessary for maintaining an independent lifestyle. The trend of increasing age in the world population profile has been accompanied by a steady rise in the prevalence of AD (Kaddurah et al., 2009).

Clinically, AD is characterized by a slow progression loss of cognitive functions and neuropathologically, AD is characterized by the accumulation of misfolded protein namely beta-amyloid ( $A\beta$ ) protein in the form of senile plaques together with hyperphosphorylated tau ( $\tau$ ) protein in the form of neurofibrillary tangles (NFT) (Bertram, Lill & Tanzi, 2010).

During the G8 Dementia Summit that was held on December 11, 2013 in London, the tragedy of AD was raised by British Prime Minister, David Cameron. UK Health Secretary Jeremy Hunt had described the condition as a global challenge during the summit. AD contributes to 62% of those living with dementia. Dementia is incurable